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CERTIFICATION OF MARTECH INTERNATIONAL, INC. PIONEER I OBSERVAT--ETC(U)  
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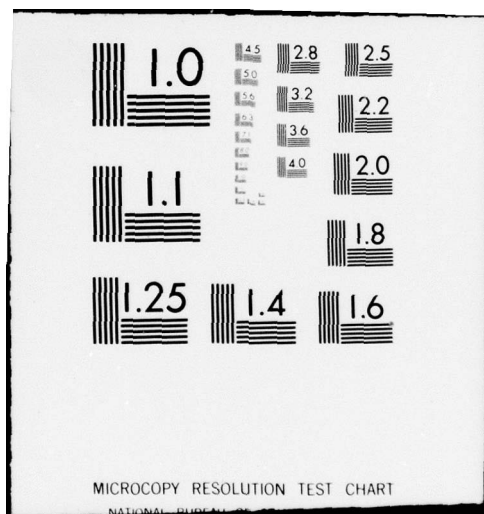
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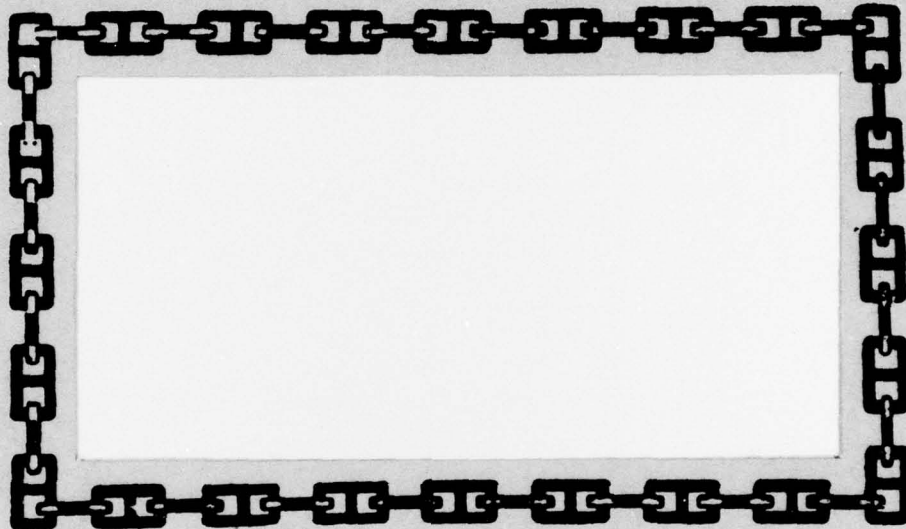
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NAVY EXPERIMENTAL DIVING UNIT

REPORT NO. 17-78

6 CERTIFICATION OF MARTECH INTERNATIONAL, INC.  
PIONEER I OBSERVATION SUBMERSIBLE  
TO ABS STANDARDS

10 JAMES W. McCARTHY

11 NOVEMBER 1978

12 15p.

14 NEDU-17-78

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The Martech International Pioneer I observation submersible was tested both unmanned and manned by NEDU in November 1978 in accordance with the certification requirements established by the American Bureau of Shipping (ABS).  The unmanned hydrostatic test was performed to 1 1/4 times the operating depth pressure to verify the integrity of the submersible		

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pressure vessel. The manned test was performed to operating depth pressure to verify the functions of the submersible. The tests proved the integrity and operability of the submersible to operate safely at a depth of 1200 FSW to the certification standards of ABS.

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### Glossary

#### Abbreviation

#### Definition

ABS	American Bureau of Shipping
FSW	Feet of Seawater
NCSC	Naval Coastal Systems Center
NEDU	Navy Experimental Diving Unit
OSF	Ocean Simulation Facility



### Abstract

The Martech International Pioneer I observation submersible was tested both unmanned and manned by NEDU in November 1978 in accordance with the certification requirements established by the American Bureau of Shipping (ABS).

The unmanned hydrostatic test was performed to 1 1/4 times the operating depth pressure to verify the integrity of the submersible pressure vessel. The manned test was performed to operating depth pressure to verify the functions of the submersible. The tests proved the integrity and operability of the submersible to operate safely at a depth of 1200 FSW to the certification standards of ABS.

## I. INTRODUCTION

Any vessel intended to be used to transport personnel below the surface of the water and to be used within the Continental waters governed by the United States of America must first be certified by the American Bureau of Shipping. This certification includes testing to prove the material adequacies and system integrity under actual or simulated conditions.

In August 1978, Martech International Incorporated requested by letter to the Navy Experimental Diving Unit (NEDU) the use of the Ocean Simulation Facility (OSF) to test the Pioneer I manned observation submersible. In November 1978, the Martech International Pioneer I submersible was transported to NEDU and two separate certification tests were performed using the wet chamber of the OSF. Test No. 1 was the unmanned hydrostatic test of the pressure hull to a test depth of 1450 FSW. Test No. 2 was performed with personnel within the submersible to a depth of 1200 FSW.

## II. TEST PLAN (Reference NEDU Test No. 78-40)

The Pioneer I submersible was loaded on the wet chamber handling system and inserted into the wet chamber. The submersible was lashed down to the wet chamber padeyes with cables which were designed to withstand the 200 pound positive buoyancy of the vehicle. A preassembled electrical and signal cable provided by the Martech International Corporation was installed between the submersible and penetrator E31 in the wet chamber. This cable provided audio and video signals and a water detector alarm from within the submersible to the second level of the OSF at the chamber pressure control panel. Telex communication links were established between the pressure control panel and the trunk hatch operator, the wet chamber drain valve operator and the overhead crane operator. These links were necessary during the manned test to convey immediate instructions in the event of a problem within the submersible. The wet chamber portable hatch was installed at the trunk level to reduce the gas volume necessary to pressurize the chamber complex.

At the conclusion of the unmanned test, the water level in the chamber was lowered to below the Pioneer I submersible entry hatch, the portable trunk hatch was undogged and lowered so that the personnel could step directly onto the submersible and enter for inspection.

At the completion of the inspection of the submersible, personnel who were to ride the Pioneer I during the manned test received a physical examination by the NEDU Staff Medical Doctor and signed the "Consent

Form" (Attachment A) and the "Personal Indemnity Agreement" form (Attachment B). In addition Martech International, Inc. signed a company "Indemnity Agreement" form (Attachment C).

### III. RESULTS AND DISCUSSION

Test No. 1, the unmanned hydrostatic test of the Pioneer I was successful and the submersible passed the hydrostatic test requirements of the American Bureau of Shipping. During the initial filling of the chamber, a valve on the Pioneer I submersible required minor adjustment because it would not open to allow water to enter the side ballast tank. During the initial pressurization of the submersible small implosions could be heard from the crushing of syntactic foam bubbles under the extreme pressure. This caused only minor cosmetic damage to the submersible.

Test No. 2, the manned test of the Pioneer I, was started the next morning with all NEDU personnel at their assigned stations and each person instructed on actions to be taken in the event of an accident within the submersible. The chamber was filled to within 2 inches of the top of the chamber to minimize gas volume and all systems within the Pioneer I submersible were checked out. Martech personnel requested additional stops be made at the 100, 300, 750 and 1000 FSW levels and NEDU dive supervisor and diving officer agreed with this change to the test plan. The dive started and progressed extremely well until a chamber depth of 1125 FSW when the Pioneer I crew reported a small weeping leak at the sonar electrical hull penetrator. The diving officer, diving supervisor and the facility engineer discussed the problem with the Martech technical staff and decided to abort the dive and repair the penetrator or plug the hull penetration. After the pressure was relieved in the wet chamber the water level was lowered, the hull penetrator was removed and it was decided that a blank plug would be installed in its place.

NEDU made arrangements for the machine shop, Naval Coastal Systems Center (NCSC) to fabricate the blank penetrator plug and the Martech personnel installed it into the Pioneer I.

The crew re-entered the submersible and the wet chamber was again filled to within 2 inches of the top. At 1530 on 9 November 1978, the manned pressure test of the Pioneer I submersible commenced and was completed successfully three hours later.

### IV. CONCLUSIONS

The ABS certification test of the Martech International, Inc. Pioneer I submersible was completed successfully. For Martech



International, it was a successful test conducted in an environment which minimized the risks of uncontrolled natural elements existing in the open ocean which could have caused delays and life hazardous conditions. Further, it eliminated the high cost of transportation to an at sea location and the on-scene support to accomplish the required test.

Under the controlled conditions of the Navy Experimental Diving Unit's hyperbaric facility, the tests were performed managing and minimizing the risk of catastrophic failure and possible loss of life.

V. REFERENCES

a. American Bureau of Shipping, New York, Guide for the Classification of Manned Submersibles, 1968

b. NEDU Test Plan 78-40 dated 10 October 1978

CONSENT TO PARTICIPATE VOLUNTARILY IN NEDU  
TEST NUMBER 78-40  
MARTECH INT'L. INC. "PIONEER I" DIVE

1. This is a consent form you are asked to sign prior to participation in NEDU Test Number 78-40, a 1200 FSW 1 atmosphere dive. Read and understand this entire form carefully before signing.
2. The preparations for the test have included the preparation of procedures for NEDU Test 78-40, November 1978. This plan should be thoroughly familiar to you prior to signing this form.
3. The preparations have also included indoctrinating you in the operation and capabilities of the OSF wet chamber during the last two days. You have been advised that in the event of an accident of any type you should remain in the Pioneer I until pressure is relieved, water is drained from the wet chamber and NEDU personnel open the top hatch on the Pioneer I to render assistance.
4. I have read this consent form, understand it, and feel that I am sufficiently trained for the test. The risks of the test are known to me, having been explained by the NEDU Dive Officer and Dive Supervisor, and I accept the risks.

SIGNED:

Robert Stan  
Name  
7 Nov 78

WITNESSED:

DM Stefan  
CDR MC USN

APPROVED:

C. A. Bartholomew  
C. A. BARTHOLOMEW  
CDR, U.S. Navy  
Commanding Officer



CONSENT TO PARTICIPATE VOLUNTARILY IN NEDU  
TEST NUMBER 78-40  
MARTECH INT'L. INC. "PIONEER I" DIVE

1. This is a consent form you are asked to sign prior to participation in NEDU Test Number 78-40, a 1200 FSW 1 atmosphere dive. Read and understand this entire form carefully before signing.
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4. I have read this consent form, understand it, and feel that I am sufficiently trained for the test. The risks of the test are known to me, having been explained by the NEDU Dive Officer and Dive Supervisor, and I accept the risks.

SIGNED:

Name

*Borden G. Burksdale, Jr.*

WITNESSED:

*J. S. Hae* LT, CEC, USN 11/7/78

APPROVED

*C. A. Bartholomew*  
C. A. BARTHOLOMEW  
CDR, U.S. Navy  
Commanding Officer

NAVY EXPERIMENTAL DIVING UNIT  
PERSONAL INDEMNITY AGREEMENT

KNOW ALL MEN BY THESE PRESENTS:

That the undersigned

R. STARR  
(Name)

an individual employed by MARTECH INTERNATIONAL, INC. a CORPORATION organized and existing under the laws of the state of DELAWARE, in consideration of permission granted to MARTECH for the use of Navy-owned or leased equipment and facilities, including but not limited to the Ocean Simulation Facility, Test Pool and associated equipments of the Navy Experimental Diving Unit and as a condition precedent therein, does hereby expressly agree to indemnify and hold harmless the United States Government, its agencies and instrumentalities against all suits, actions, claims, costs, or demands (including without limitation, suits, actions, claims, costs, or demands for death, personal injury, and property damage) to which the Government, its agencies and instrumentalities may be subject by reason of damage or injury (including death) to myself or my property arising or resulting from any and all operations hereafter performed either by the Navy Experimental Diving Unit or by the undersigned, its agents, employees, or subcontractors in the manufacture, transportation, installation, test, or other use of a model or test equipment and facilities or using any Navy-owned or leased equipment in connection with a construction project, or affecting any other work which the undersigned may require of the Navy Experimental Diving Unit during the time that the above described work is performed, or in any other way arising therefrom or connected therewith.

The undersigned hereby waives any and all claims which, but for this waiver, it may have, or which it may hereafter acquire, against the United States Government, arising out of the operations above described.

IN WITNESS WHEREOF, this waiver has been duly executed this 7 day of Nov 19 78.

R. STARR  
(Name)

By Robert J. Starr  
(Signature)

WITNESSES

1. JAMES E. HAWARTH [Signature] CT, CEC, USN 11/7/78  
(Name) (Signature)
2. Douglas M. Stetson [Signature]  
(Name) (Signature)

NAVY EXPERIMENTAL DIVING UNIT  
PERSONAL INDEMNITY AGREEMENT

KNOW ALL MEN BY THESE PRESENTS:

That the undersigned

Gordon G. BARKSDALE JR.  
(Name)

an individual employed by MARTECH INTERNATIONAL, INC. a CORPORATION organized and existing under the laws of the state of DELAWARE, in consideration of permission granted to MARTECH for the use of Navy-owned or leased equipment and facilities, including but not limited to the Ocean Simulation Facility, Test Pool and associated equipments of the Navy Experimental Diving Unit and as a condition precedent therein, does hereby expressly agree to indemnify and hold harmless the United States Government, its agencies and instrumentalities against all suits, actions, claims, costs, or demands (including without limitation, suits, actions, claims, costs, or demands for death, personal injury, and property damage) to which the Government, its agencies and instrumentalities may be subject by reason of damage or injury (including death) to myself or my property arising or resulting from any and all operations hereafter performed either by the Navy Experimental Diving Unit or by the undersigned, its agents, employees, or subcontractors in the manufacture, transportation, installation, test, or other use of a model or test equipment and facilities or using any Navy-owned or leased equipment in connection with a construction project, or affecting any other work which the undersigned may require of the Navy Experimental Diving Unit during the time that the above described work is performed, or in any other way arising therefrom or connected therewith.

The undersigned hereby waives any and all claims which, but for this waiver, it may have, or which it may hereafter acquire, against the United States Government, arising out of the operations above described.

IN WITNESS WHEREOF, this waiver has been duly executed this 7 day of NOV 19 78.

Gordon G. Barksdale, Jr.  
(Name)

By Gordon G. BARKSDALE JR.  
(Signature)

WITNESSES

1. JAMES E. HALWACH  
(Name)

James E. Halwach LTJG, USN 11/7/78  
(Signature)

2. Douglas M. Stelson  
(Name)

Douglas M. Stelson  
(Signature)



NAVY EXPERIMENTAL DIVING UNIT  
INDEMNITY AGREEMENT

KNOW ALL MEN BY THESE PRESENTS:

That the undersigned MARTECH INTERNATIONAL, INC.  
(Business Name)

a Corporation organized and existing under the laws of the state of Delaware, in consideration of permission granted for the use of Navy-owned or leased equipment and facilities, including but not limited to the Ocean Simulation Facility, Test Pool and associated equipments of the Navy Experimental Diving Unit and as a condition precedent therein, does hereby expressly agree to indemnify and hold ~~harmless~~ the United States Government, its agencies and instrumentalities against all suits, actions, claims, costs, or demands (including without limitation, suits, actions, claims, costs, or demands for death, personal injury, and property damage) to which the Government, its agencies and instrumentalities may be subject by reason of damage or injury (including death) to the property of person of anyone, whomsoever they may be, arising or resulting from any and all operations hereafter performed either by the Navy Experimental Diving Unit or by the undersigned, its agents, employees, or subcontractors in the manufacture, transportation, installation, test, or other use of a model or test equipment and facilities or using any Navy-owned or leased equipment in connection with a construction project, or affecting any other work which the undersigned may require of the Navy Experimental Diving Unit during the time that the above described work is performed, or in any other way arising therefrom or connected therewith.

The undersigned hereby waives any and all claims which, but for this waiver, it may have, or which it may hereafter acquire, against the United States Government, arising out of the operations above described.

IN WITNESS WHEREOF, this waiver has been duly executed this 28 day of September 19 78.

MARTECH INTERNATIONAL, INC.

(Business Name)

By

(President, ~~XXXXXXXXXXXX~~)

CORPORATE CERTIFICATE

I, HAROLD B. LEE, certify that I am the CORPORATE Secretary of the Corporation executing this waiver, that Tom C. Culbertson who signed this waiver on behalf of said corporation, was the President thereof; that the seal affixed to this waiver is the corporate seal of said corporation, and that said waiver was duly signed for and in behalf of the said corporation and said corporate seal was affixed thereto by authority of its governing body.